Network Allocation Schedules

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This article reviews the reasons and needs for the Network Allocation Schedule and briefly describes the make up of these schedules and how they are used. The major emphasis is placed on the implementation of these schedules, including a new special-purpose software. This software makes use of an existing file management program and IBM 360 utility programs.

I. Introduction

The Network Allocation Schedules are a part of the DSN Operations and Analysis function, and are the means by which all operational activities of the Deep Space Network are committed and scheduled.

The basic need for the forecasting and scheduling of the network support requirements, and methods of accomplishing this were discussed in Ref. 1, and will be reviewed only briefly here. This article will deal with the implementation of these methods and their initial results.

II. Function

The Network Allocation Schedules provide the means of sizing the network and committing its resources to the various users. These commitments are made far enough in advance, and iterated enough times, to allow for ad-justment in the resources and/or changes in the user's basic project design, then compensating for any period when the requirements exceed the base resources.

III. Elements

The Network Allocation Schedules originally consisted of four levels of schedules involving ever-increasing detail regarding time and equipment required, and covering ever-decreasing periods of time.

The four levels of schedules as originally planned were the 130-Week Network Loading Schedule, the 72-Week Network Allocation Schedule, the 8-Week Operations Planning Schedule, and the 7-Day Operations Schedule. In actual operation during the past eighteen months, it was found that there was a great deal of duplication in the 72- and 130-Week Schedules, and that the 72-Week Schedule was far too voluminous to be useful. It was

therefore decided to delete the 72-Week Schedule, using the 130-Week Schedule to cover the period and, further, to expand the 130-Week Schedule to a 150-Week Schedule, thus covering a full budget period.

IV. Implementation

Two approaches were taken for the implementation of these schedules. Initially, it was necessary to get them into operation as soon as possible, first manually then with computer assistance. On a longer term, the detailed design and implementation of a fully interactive software package was required.

The latter effort was initiated by letting a contract for a design study and the preparation of a design specification covering a new interactive scheduling software package (JPL 70-246, Software Requirements Document for JPL Mark IIIA DSN Scheduling Program). This design specification is currently being implemented and the preliminary software should be available by January 1, 1972.

The initial effort to put the new schedule in operation was undertaken by the DSN Scheduling Office as an internal effort. All of the various forms in use were reviewed, revised as required, and reduced from seven forms to two forms, which could be used at all levels of scheduling. A controlled dictionary of schedule configurations was established so that users could schedule their various requirements by referencing the appropriate configuration code(s) rather than having to call out each piece of equipment required separately.

To provide computer support for this effort, it was decided to make use of a general-purpose file management program MARK IV, which was available on the 360/75 computer. The use of this software package greatly reduced the raw programming and coding time required, allowing more effort to be spent in developing the special output requirements. Using this system the basic scheduling software was operational in less than three months, and the complete program was fully operational in less than six months. The software was designed to support all four of the original levels of scheduling providing both tabular and graphic listing, as well as punched cards to interface with the Sequence of Events program and a magnetic tape containing the schedule in special format that can be directly transmitted to any remote site via teletype or high-speed data line using a 360/75 real-time program.

One added benefit in using the MARK IV software package became evident as the *Mariner* Mars 1971 mission progressed and 360/75 time became increasingly difficult to schedule. This MARK IV package, and its user software, can be run on just about any 360 or 370 machine, thus allowing scheduling operations to be shifted to another less loaded machine.

V. Conclusion

The implementation of these schedules has proceeded satisfactorily and their worth has been well proven. During the next year it is anticipated that the new (second generation) interactive software will become operational, greatly reducing the manual effort now required as well as improving response time and accuracy.

Reference

1. Tustin, D. G., "Network Allocation Schedules," in *The Deep Space Network*, Space Programs Summary 37-64, Vol. II, pp. 105–106. Jet Propulsion Laboratory, Pasadena, Calif., Aug. 31, 1970.